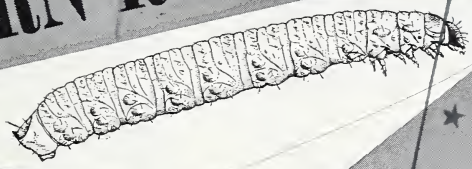
THE SOUTHERN CORN ROOTWORM



how to control it

What It Looks Like

How It Damages Corn • Peanuts

Control by Cultural Methods • Insecticides

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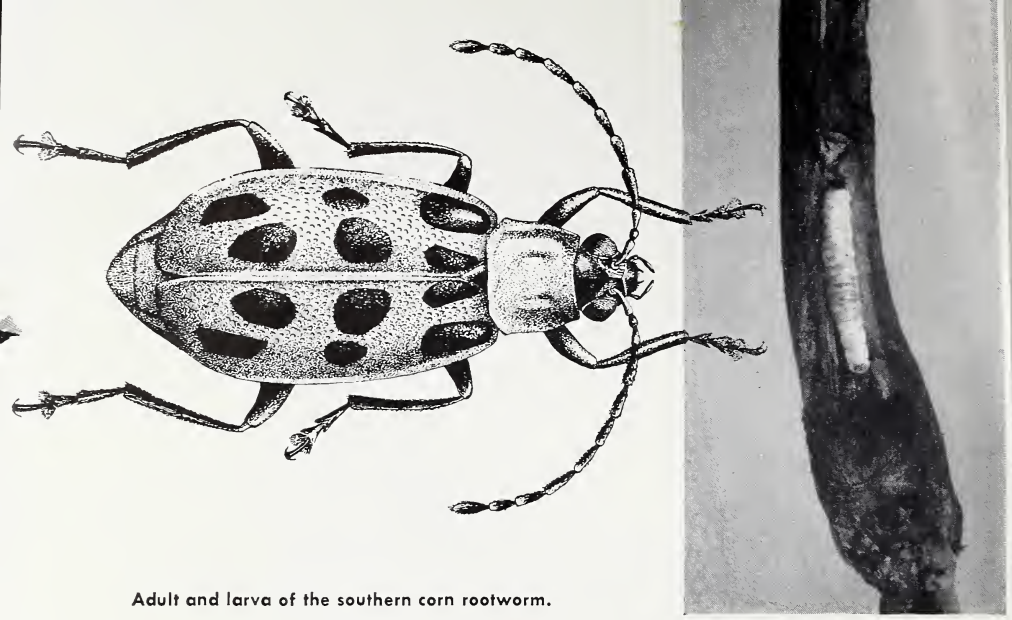


Adult and larva of the southern corn rootworm.

THE SOUTHERN CORN ROOTWORM: how to control it

The southern corn rootworm [1] can ruin a stand of young corn or severely damage an older stand. It can reduce the yield of field-cured peanuts as much as 40 percent. It also attacks cucumbers, other vegetables, melons, wheat, rice, millet, rye, oats, alfalfa, Johnson grass, and fescue grass.

This rootworm is widely distributed east of the Rocky Mountains. It is most numerous and destructive in the southern part of the country, where it is a threat to corn and peanut crops practically every year.[2]

[1] Another common name for this insect is the spotted cucumber beetle. The scientific name is *Diabrotica undecimpunctata howardi.*

[2] The corn rootworm (*Diabrotica longicornis*) and the western corn rootworm (*D. virgifera*) are serious pests of corn in more northern and western parts of the United States.

THE INSECT AND HOW IT LIVES

The southern corn rootworm has four stages in its life cycle—egg, larva (or grub), pupa, and adult (or beetle). Development from egg to adult is completed in 4 to 9 weeks. The insect usually has 2 generations a year; it may have 3 generations.

The adults are about ¼ inch long. They have yellowish-green bodies and black heads, legs, and antennae. They have 11 irregular black areas on the wings.

The adults feed on the foliage and blossoms of many kinds of plants. They winter in any kind of vegetative cover but prefer the base of plants that have not been killed by frost.

The beetles become active when the temperature reaches about 70° F.—early spring in most parts of the infested region. They are active on warm winter days in the southernmost parts of the region; they come out of their winter quarters and feed on alfalfa, rye, and oats.

The females of the first generation lay their eggs in the soil around host plants in the spring, and those of the second generation in midsummer. One female may lay as many as 500 eggs, often 100 in a day.

The eggs are yellow, oval, and about the size of a pinhead. They hatch in about 3 weeks in early spring and in about 1 week in midsummer.

The grubs that hatch from the eggs are slender and yellowish white. (They are sometimes called budworms or drillworms.) They have a brown head, and there is a brown spot on the last segment of the body. As they grow their color changes to deep yellow. When full grown, 2 to 4 weeks after hatching, they are about ½ inch long. The mature grubs make cells about 1 inch below the soil surface and transform to pupae.

The pupae are white to yellow and about ¼ inch long. They move the tip of the abdomen violently when disturbed. In a week or two the pupae change into beetles, and the beetles work their way to the soil surface.

DAMAGE TO CORN

The southern corn rootworm prefers moist soil and is most injurious to corn during cold, wet springs. Corn in low, wet fields is damaged more than corn in uplands. Corn following winter legumes that have been turned under is likely to be injured.

The insect injures corn in the following ways:

1. The grubs feed on the sprouting seed and tunnel into the roots of young plants. They often destroy several successive plantings.

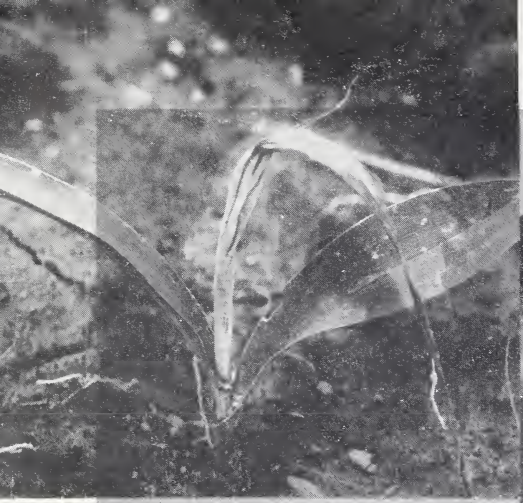
2. The grubs bore into the stalk just above the roots, eat out the crown of young plants, and kill the bud. Tillers often develop from badly injured plants but they seldom produce good ears.

3. The grubs injure the root systems of older plants in such a way that the plants lodge later in the season. Yield is reduced, and it is difficult to harvest the ears of lodged plants.

4. The beetles sometimes cut off the bud leaves of corn, but plants injured in this way usually recover.

5. The beetles sometimes interfere with pollination by feeding on the corn silks.

You can detect the grubs by examining the roots of infested corn. Some-



Young corn plant with bud killed by larvae of the southern corn rootworm.

Southern corn rootworm da

times the grubs may be found in their tunnels in the roots, but they may also be some distance away from an injured plant.

It is easy to see damage to the crown and bud of a young plant. The bud leaves of an injured plant are dead and dried up; yet the rest of the plant remains green.

A poor stand may be due to destruction of seeds or seedlings by the grubs. When the roots of an older plant are injured, the plant sometimes looks sickly or stunted.

DAMAGE TO PEANUTS

The rootworm is most injurious to peanuts when they are grown in heavy, poorly drained soil. It is frequently destructive in fields that follow a winter cover crop such as vetch or crimson clover. More damage occurs in fields where the peanut foliage is heavy than where the foliage is light.

In Virginia heavy rainfall in July and August sets up conditions that are favorable to severe rootworm damage.

The grubs bore into the pods of the peanuts and feed on the kernels. They prefer the succulent tissues of young pods but will often attack the tips of the shoots, or pegs, and kill them before they enlarge to form pods. Disease organisms may enter injured pods and cause decay.

After a heavy attack by grubs, you will find only a few pods on the vines, and most of these will be severely injured. You will find only slight scarring on the outside of peanut pods that have been lightly or moderately attacked by the grubs, but you may find that the tips and sides of developing shoots of the plants have been severely injured. Occasionally, pods that show little external injury are severely damaged and decayed inside.

to corn shows up late in season.

Larva of the southern corn rootworm in nearly mature peanut pod.

CONTROL—CORN

Plow early

When practicable, plow and disk the soil 2 weeks to a month before planting corn. Plowing and disking will destroy many of the rootworms. Keep the plowed land free of weeds until planting time; the lack of vegetation will discourage egg laying in the field by emerging beetles.

Adjust planting dates

If possible, plant corn when the rootworms are least active. In the Southeast, corn grown in the lowlands is most likely to escape injury if it is planted during the following periods:

Southern Georgia and northern Florida, April 20 to May 1.

Central Georgia and the southern half of South Carolina, May 1 to 10.

Northern Georgia, northern half of South Carolina, and all of North Carolina, May 10 to 20.

As a rule it is not practicable to plant early in the lowlands because of wet soil and danger from frost.

The Alabama Agricultural Experiment Station recommends that around Auburn legumes be plowed under by April 15 and that corn be planted in early May.

The Louisiana Agricultural Experiment Station recommends planting before March 15 or after April 25.

Plant more thickly

In the lowlands in the South, plant more thickly than normal in order to get a good stand. This is worth while unless the planted area is so large that thinning the stand would require an

Effect of injury by the southern corn rootworm on yield of peanuts: Uninjured plant, at right, has numerous developing and maturing pods; injured plant, at left, has few.

unjustifiable amount of additional labor.

Produce sturdy plants

Plant adapted corn hybrids that are recommended for your locality. They produce well-developed roots that will withstand attack by the rootworm and resist lodging. Such hybrids, if infested, are able to recover and replace damaged root systems rapidly.

Follow a sound crop rotation.

Fertilize according to State and county recommendations. Plants grown in fertile soil are hardier and healthier, and more capable of withstanding attack by the rootworm, than plants grown in poor soil. Corn grown in lowland soils enriched with commercial fertilizers has less rootworm damage than corn grown in soils enriched with manure.

Apply an insecticide

Treating the soil with an insecticide spray or dust to control the rootworm is recommended by entomologists in several States. Treating seeds with insecticides and applying insecticides in granular form have shown considerable promise.

The recommendations include treating the soil with aldrin or heptachlor at the rate of ½ to 1 pound per acre, or with chlordane at the rate of 1 to 1½ pounds per acre, in one of the following ways:

1. Broadcast the maximum recommended dosage of insecticide as a spray or a dust on the soil surface before planting, and *immediately* work the insecticide thoroughly into the top 3 or 4 inches of soil by disking.

To obtain the recommended per-acre dosage of the insecticide, you can use one of the following formulations.

ALDRIN OR HEPTACHLOR.—40 pounds of 2½-percent dust or 2 quarts of an emulsifiable concentrate that contains 2 pounds of the insecticide per gallon.

CHLORDANE.—30 pounds of a 5-percent dust or 3 pints of a 45-percent emulsifiable concentrate.

Prepare a spray by mixing an emulsifiable concentrate with enough water to give adequate coverage. Use either a high- or a low-gallonage sprayer.

Dusts are ready to use when purchased. Broadcast the dust with a crop duster when there is little wind and preferably when the ground is damp. Set the nozzles of the duster close to the ground and attach a canvas trailer to prevent drift.

2. Apply a spray or a dust to the row or hills when planting. Use the minimum dosage recommended.

Treat a band about 6 inches wide over the row or hills, just behind the planter shoe. Be sure that the soil closing in behind the planter shoe covers the insecticide. Do not place the insecticide directly on the seed.

To obtain the recommended per-acre dosage of the insecticide, you can use one of the following formulations.

ALDRIN OR HEPTACHLOR.—20 pounds of 2½-percent dust or 1 quart of an emulsifiable concentrate that contains 2 pounds of the insecticide per gallon.

CHLORDANE.—20 pounds of a 5-percent dust or 2 pints of a 45-percent emulsifiable concentrate.

3. Apply a mixture of insecticide and fertilizer either before planting or at time of planting.

If you apply the mixture before planting, broadcast it with a fertilizer distributor at a rate that will give the maximum recommended per-acre dosage of insecticide.

If you apply the mixture at time of planting, apply it to rows or hills at a rate that will give the minimum recommended per-acre dosage of insecticide. Use fertilizer side-dressing attachments.

Follow directions on the bag to find the amount of mixture that will give the required dosage of insecticide.

Do not place the mixture in direct contact with the seed.

CONTROL—PEANUTS

Apply an insecticide to the soil before planting or just before you cultivate the peanuts for the first time. If you broadcast the insecticide, cultivate *immediately* after the application and work the insecticide thoroughly into the top 3 or 4 inches of soil.

Use 2 pounds of aldrin or heptachlor per acre, in one of the following ways:

1. Broadcast a free-flowing 5-percent aldrin or heptachlor dust with a crop duster at the rate of 40 pounds per acre. Apply when there is little wind and preferably when the ground is damp. Set the nozzles of the duster close to the ground and attach a canvas trailer to prevent drift.

2. Apply 100 pounds of 2-percent aldrin granules or 80 pounds of 2½-percent heptachlor granules per acre. Broadcast the granules with a fertilizer distributor or lime spreader, *or* apply them to the rows with fertilizer side-dressing attachments.

3. Broadcast an aldrin- or heptachlor-fertilizer mixture with a fertilizer distributor, *or* apply it to the rows with fertilizer side-dressing attachments. Directions on the bag will show the amount you need to use to obtain the recommended per-acre dosage of insecticide.

Celatoria diabroticae, a parasite of the southern corn rootworm.

NATURAL ENEMIES

The southern corn rootworm has only a few insect enemies. The chief one, although it is not usually abundant, is a fly known as *Celatoria diabroticae*. This fly inserts a maggot in the abdomen of the corn rootworm beetle. The maggot feeds on the beetle's vital organs and kills it. It then pupates in a dark brown case, called a puparium, which may be inside the beetle or in the ground. The fly emerges from this case at the end of the pupal period.

Several birds, including the bobwhite, redheaded woodpecker, nighthawk, cardinal, kingbird, and phoebe, eat rootworm beetles.

PRECAUTIONS

Aldrin, chlordane, and heptachlor are poisonous. Handle them with care. Follow all directions and heed all precautions on the container. Keep insecticides off the skin and away from the eyes and nose. Wear a respirator when working in high concentrations of a dust. Bathe thoroughly and change to clean clothing after using an insecticide.

If an insecticide is accidentally swallowed, induce vomiting by taking 1 tablespoon of salt in a glass of warm water. Repeat if necessary. Call a physician.

ASK ABOUT THE MOST RECENT CONTROL RECOMMENDATIONS

If you use insecticides for control of the southern corn rootworm in your crops, make sure that you follow up-to-date practices. The recommendations made in this leaflet are new; they may be modified by further research.

Check with your county agricultural agent or State agricultural experiment station on the latest insecticide recommendations for your locality.

This leaflet was prepared by the Entomology Research Branch, Agricultural Research Service. It supersedes Farmers' Bulletin 950, The Southern Corn Rootworm and Farm Practices To Control It, and EC–23, Control of the Southern Corn Rootworm on Peanuts.

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